

AbstractID: 5500 Title: Image Guided High Definition Dosimetry of IMRT Plans Using the mobileMOSFET System

Purpose: To investigate the feasibility of using multiple MOSFET sensors, available with the mobileMOSFET® system as high definition dosimeter for IMRT plan verification.

Methods and Material: Wireless dosimetry system (mobileMOSFET from Thomson Nielsen) was first tested for reproducibility, linearity, sensitivity, long-term performance, and angular dependency. Twenty head and neck plans, each consisting of 8-10 treatment fields were verified. Plans were generated in Pinnacle 7.6C, and exported to a cylindrical solid water phantom. The in-phantom dose distribution was calculated on the phantom CT image set, and two regions of interest were selected: GTV area and avoiding area. The doses at these points were measured using MOSFETs and compared to ionization chamber measurements and Pinnacle calculations. Site specific fixed configurations of 5 MOSFET positions has been developed, and ten patient plans were verified using this module. CBCT image guidance was used to accurately position the MOSFET phantom.

Results: The response of MOSFET was found to be linear, reproducible (within $\pm 2\%$), independent of angular positions (within $\pm 2\%$) and stable with time. For 20 head and neck patients, average variations of $(0.68 \pm 2.11)\%$ at high dose point and $(0.06 \pm 1.94)\%$ at low dose point were observed between measured dose using MOSFET and ionization chamber. Average variations of $(0.73 \pm 1.85)\%$ and $(0.96 \pm 2.00)\%$ were observed between measured dose using MOSFET and plan dose at high and low dose points respectively. A $(0.47 \pm 2.45)\%$ variation was observed using the special insert for head and neck and prostate plans in four points out of five.

Conclusions: These investigations indicate that the use of mobileMOSFET device with image guidance would be suitable for efficient and high-resolution dose verification of complex IMRT plans.